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ABSTRACT

Critical thinking skills figure prominently among the goals for education proposed by educational researchers, parents, and employers. This digest discusses the skills related to critical thinking and three specific strategies for teaching these skills. The first, Building Categories, is an inductive reasoning tool that helps students categorize information by discovering the rules rather than merely memorizing them. Active learning of this sort typically results in better understanding and retention than is possible with more directive teaching. The Finding Problems strategy is a way of framing tasks so that students use skills similar to those needed for the ill-defined problems they will encounter in life. The Enhancing the Environment strategy acknowledges that critical thinking in the classroom is facilitated by a physical and intellectual environment that encourages a spirit of discovery. Seating arrangements and visual aids are useful in promoting active learning. (Contains 6 references.) (SLD)

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Strategies for Teaching Critical Thinking

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Critical thinking skills figure prominently among the goals for education, whether one asks developers of curricula, educational researchers, parents, or employers. Although there are some quite diverse definitions of critical thinking, nearly all emphasize the ability and tendency to gather, evaluate, and use information effectively (Beyer, 1985).

In this digest, we discuss skills related to critical thinking and three specific strategies for teaching these skills: 1) Building Categories, 2) Finding Problems, and 3) Enhancing the Environment.

Skills related to Critical Thinking

Across subject areas and levels, educational research has identified several discrete skills related to an overall ability for critical thinking. These are:

- Finding analogies and other kinds of relationships between pieces of information
- Determining the relevance and validity of information that could be used for structuring and solving problems
- Finding and evaluating solutions or alternative ways of treating problems

Just as there are similarities among the definitions of critical thinking across subject areas and levels, there are several generally recognized "hallmarks" of teaching for critical thinking (see, for example, Beyer, 1985; Costa, 1985). These include:

- **Promoting interaction among students as they learn** - Learning in a group setting often helps each member achieve more.
- **Asking open-ended questions that do not assume the "one right answer"** - Critical thinking is often exemplified best when the problems are inherently ill-defined and do not have a "right" answer. Open-ended questions also encourage students to think and respond creatively, without fear of giving the "wrong" answer.
- **Allowing sufficient time for students to reflect on the questions asked or problems posed** - Critical thinking seldom involves snap judgments; therefore, posing questions and allowing adequate time before soliciting responses helps students understand that they are expected to deliberate and to ponder, and that the immediate response is not always the best response.
- **Teaching for transfer** - The skills for critical thinking should "travel well." They generally will do so only if teachers provide opportunities for students to see how a newly acquired skill can apply to other situations and to the student's own experience.

Building Categories (after Seiger-Ehrenberg, 1985)

Students often are given (and asked to memorize) explicit rules for classifying information. For example, there is a set of criteria for determining whether a word is being used as a noun or as a verb. The Building Categories strategy, however, is an inductive reasoning tool that helps students categorize information by discovering the rules rather than merely memorizing them. Such active learning typically results in better understanding and better retention of the concepts and related material than is possible with a more directive teaching method.

Example: Distinguishing animals from plants. Students work in two groups (Animal Group and Plant Group). Worksheets prepared in advance ask for information about life span, energy sources, motility, anatomy, etc., of several different animals and plants. Once the information is collected, it is compiled into large wall charts (one for Animals, one for Plants).

At this point, some questions can be posed to both groups at once: What are the similarities among the members of each group? What are the differences between the two groups? How could the following statement be completed: "An animal is different from a plant because..." The teacher provides appropriate feedback throughout, using open-ended questions to help students identify inadequate or inaccurate categorization rules.

Finally, the students are allowed to test the generalizability

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of their proposed rules by looking at new instances and placing them in the appropriate category.

The strategy is described here in the context of a science problem, but can work equally well in other disciplines and with more abstract categories. For example, students in Social Studies can learn the rules for "discoveries" versus "inventions," and students of jurisprudence can discover the differences between "felonies" and "misdemeanors."

Finding Problems

Many students and teachers alike have lamented that the format of problems in the classroom (particularly in math and science) bears little resemblance to the way problems look in real life. In fact, one of the most important practical thinking skills one can acquire is knowing how to identify a problem. The Finding Problems strategy is a way of framing tasks so that students use skills similar to those needed for the ill-defined problems they will encounter in life. Tasks developed with this strategy are sufficiently defined as to be solvable, but do not state explicitly which variable or aspect of the problem will constitute or enable a solution. Consider the following physics problem (adapted from Harvie, 1987):

Brian, all 72 kg of him, bungee-jumps from a 100-m tower toward the river below. He falls 35 m before the bungee cord starts to stretch. This cord can stretch 40% of its length and has a breaking strength of 7000 N. Will this become a "free fall" for Brian, or will he "bounce back"?

Consider an alternate version of this problem, in which the last sentence is replaced by the following: "When the bungee cord has reached its maximum length, does the tension exceed the cord's breaking strength?" Several aspects of the first version make it more effective for encouraging students to think rather than simply to look for the appropriate quantities to "plug in" to a formula.

The first version does not specify what must be calculated; therefore, it requires students to decide for themselves just what the problem is and how their knowledge of Physics can be used to solve it. Teachers can help students learn to solve problems of this type by first providing them with a set of general questions, such as: How are the objects and situations in the problem similar to any objects or situations that were discussed in Physics? Which variables are already in Physics terms and which can be converted to Physics terms? Are all of the pieces of information in the problem relevant to its solution?

Problem-finding is an excellent group activity, particularly if two or more groups work on the same task independently and then come together to compare strategies. In this way, each student has the benefit of exposure to several ways of solving the problem.

Enhancing the Environment (after Keefe & Walberg, 1992)

Critical thinking in the classroom is facilitated by a physical and intellectual environment that encourages a spirit of discovery. Regarding the physical layout of the classroom, two suggestions can be offered. First, if seating is arranged so that students share the "stage" with the teacher and all can see and interact with each other, this helps to minimize the passive, receptive mode many students adopt when all are facing the teacher. Second, visual aids in the classroom can encourage ongoing attention to critical thought processes, e.g., posting signs that say, "Why do I think that?" "Is it fact or opinion?" "How are these two things alike?" "What would happen if...?" Suggestions below each question can remind students how they should go about answering them. Most importantly, as the students move through the curriculum in a given subject, their attention can be directed periodically to the signs as appropriate. In this way, the signs emphasize the idea of transfer by showing that many of the same thinking strategies and skills apply to different topics and problems.

References and Recommended Reading

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